

# Light Measurement Report

Print date: 7-7-2025

Measurement date and time: 7-7-2025 09:39:24 – Measurement no. VFR-250707-1959-MS

Measurement tracking No. and Link: [VT250707-000791](https://www.viso-systems.com/track/VT250707-000791)

Operator:



## Laboratory and Equipment

Laboratory Owner and Location  
Goniospectrometer System and Type  
Sensor Name, Calibr. Date and Serial No.  
Spectrometer Manufacturer and Model

Viso Systems, Copenhagen V, Denmark  
LabSpion – Type C, horizontal  
LabSensor Model2 – 11-1-2024 – 3130191315  
Ibsen Photonics, Denmark – Freedom VIS (Custom Viso)

## Measurement Conditions

Number of C-planes and Resolution  
 $\gamma$  (gamma)-Resolution  
Test Distance  
Input Power, Power and Displ. Factors  
Input RMS Voltage and Current  
Frequency of Input Power  
Warm-up Time and Variation

72 planes – 5°  
5°  
2,79 m  
26,2 W – PF 0,87 – DPF 0,99  
230 V – 0,130 A  
50 Hz  
Lamp stabilized in 15 min 2 sec – 2,0%

## Tested Light Source

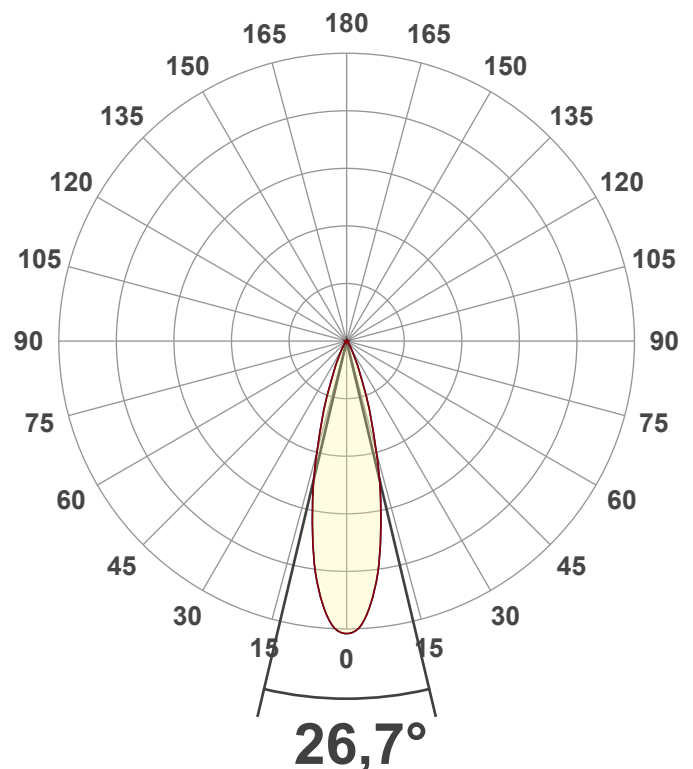
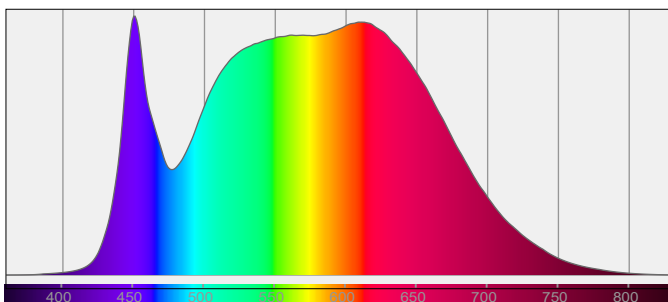
Product Name  
Item No. and Manufacturer  
Product Description (line 1)

812027-4000K-25W  
812027-4000K-25W – Dutchfulfillment  
3-FASE RAILSPOT | ZOOMABLE | WATT SWITCH | CCT-SWITCH | WIT

## Main Light Measurement Results

Output – Total Lumen (Up% / Down%)  
Efficiency  
Peak Intensity and Beam Angle  
Correlated Color Temperature, Target/Measured  
Color Rendering Index  
Color Rendering TM30-18  
Color Shift, CIE duv and MacAdam Steps  
Flicker

2279 lm – 0,05% / 99,95%  
87 lm/W  
8863 cd – 26,7°  
CCT = 4000 K / 4185 K  
CRI 91,1  
 $R_f$  91,0 –  $R_g$  97,1  
Duv 0,0069 – SDCM 6,4  
SVM 0,03 – PstLM 0,12



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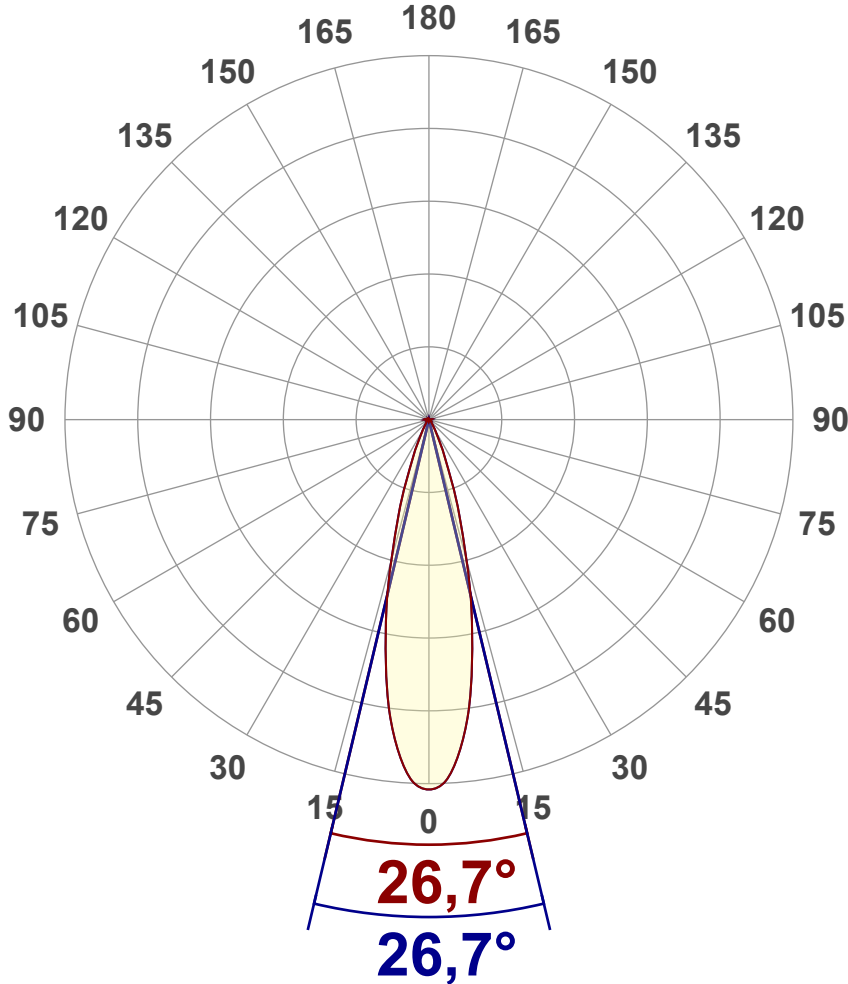
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## Luminous Intensity diagram

Unit: 0-100% of peak intensity



## Main Values

Output (total Lumen)	2279 lm
Lumen Up% / Down%	0,05% / 99,95%
Peak Intensity	8863 cd
Beam Angle (50%)	26,7°
Beam Angle (90%)	26,7°
Beam Angle (10%)	26,7°

## Cut-off Angle

Average 2,5%	65°
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## Field Angle

Average 10%	47,8°
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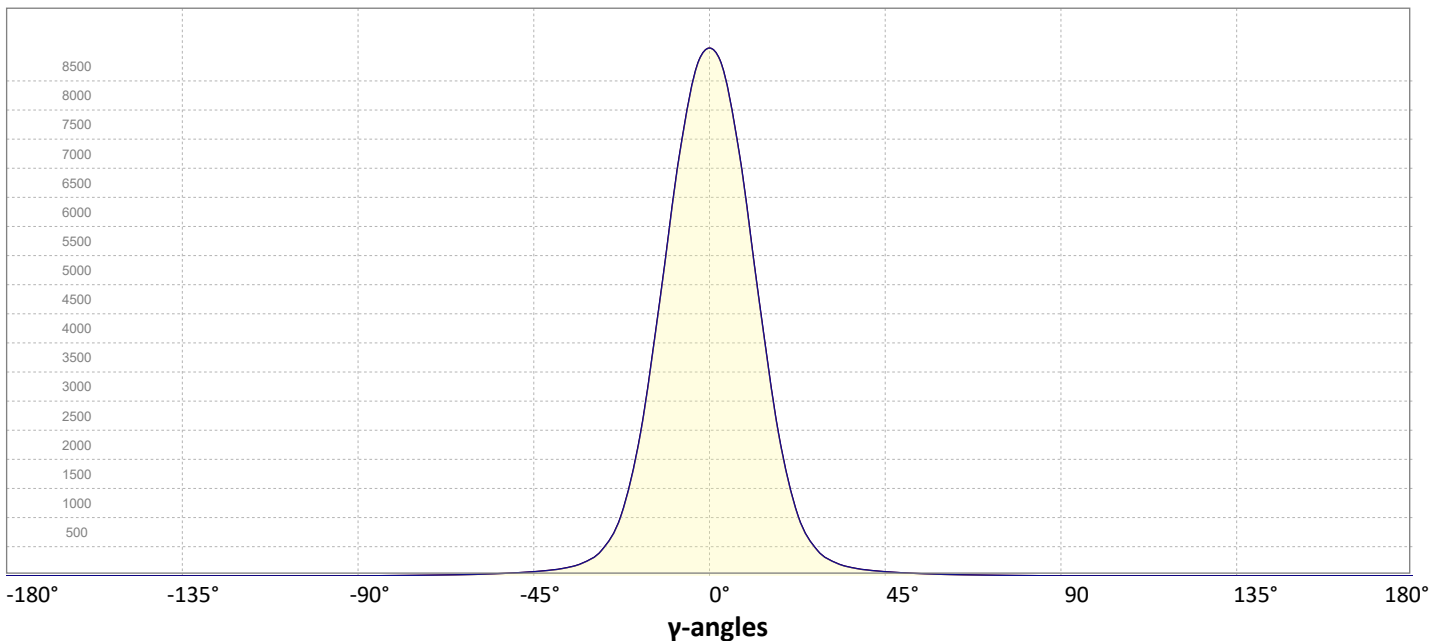
## Intensity Ratio

In 120° cone	98,8%
In 90° cone	96,4%

**C000-C180**

**C090-C270**

## Linear distribution diagram - Intensity (candela) vs $\gamma$ -angle



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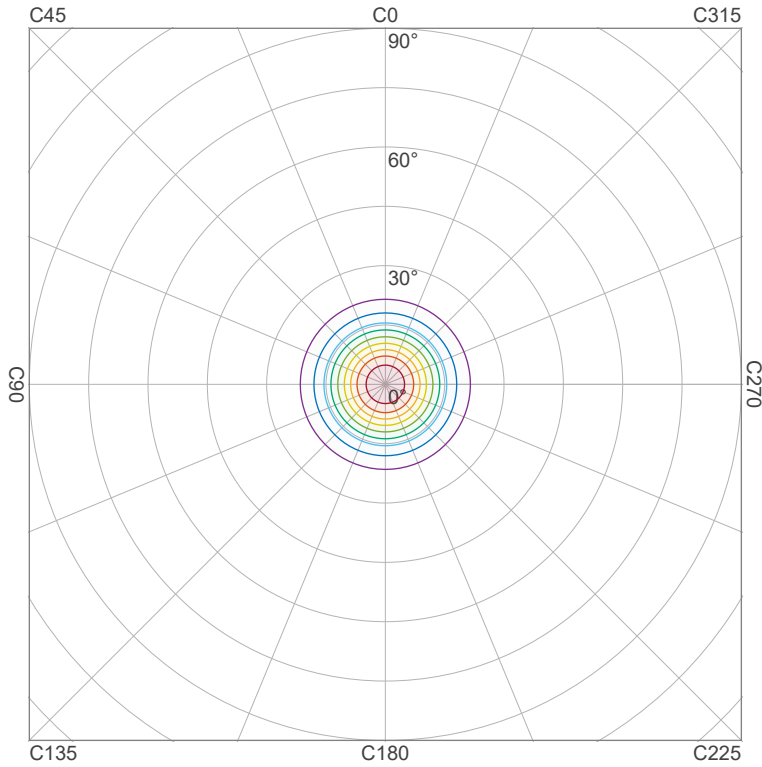
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## Iso-intensity Diagram (Iso-candela)

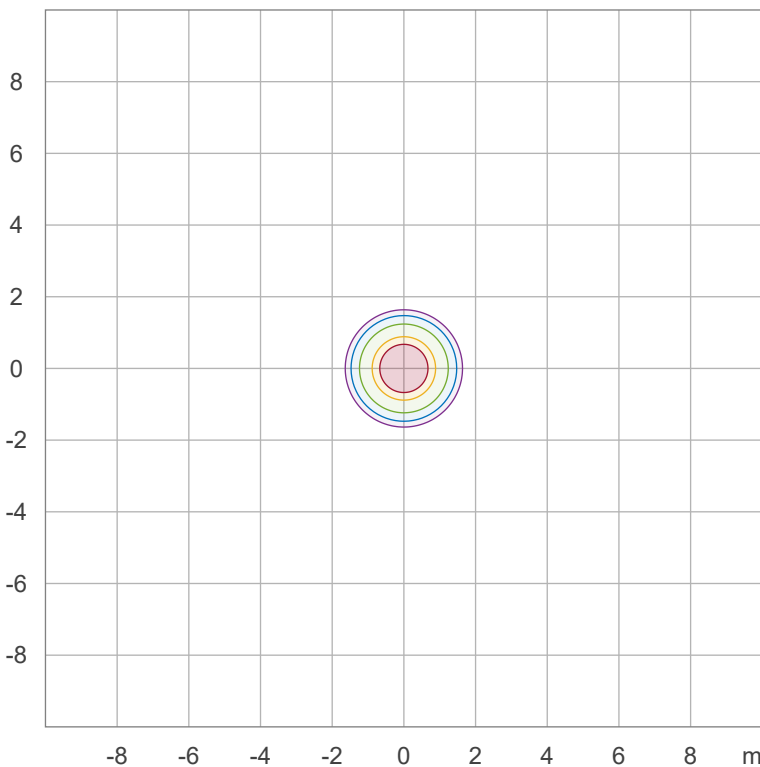


90 %	7976,3 cd
80 %	7090,1 cd
70 %	6203,8 cd
60 %	5317,5 cd
50 %	4431,3 cd
40 %	3545,0 cd
30 %	2658,8 cd
20 %	1772,5 cd
10 %	886,3 cd

Peak intensity: 8862,6 cd

Number of c-planes: 72

## Iso-illuminance Diagram (Iso-lux)



50,0 %	492,4 lx
30,0 %	295,4 lx
10,0 %	98,5 lx
5,0 %	49,2 lx
3,0 %	29,5 lx

Peak illuminance: 984,7 lx

Mounting height: 3,0 m

Number of c-planes: 72

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## Color details

Correlated Color Temperature, Target CCT = 4000 K  
 Correlated Color Temperature, Measured CCT = 4185 K  
 Color Rendering Index CRI 91,1  
 Color Rendering Index, R9 (red component) R9 = 57,1  
 Color Rendering TM30-18 R<sub>f</sub> 91,0 – R<sub>g</sub> 97,1  
 Color Quality Scale CQS = 92,1

MacAdam Steps SDCM = 6,4  
 Color coordinates CIE 1931 (x;y) = (0,381;0,377)  
 Color coordinate CIEs 1960 (u;v) = (0,225;0,334)  
 Color deviation from BBL Duv = 0,0069  
 Color coordinate CIEs 1976 (CIELUV) (u';v') = (0,225;0,502)

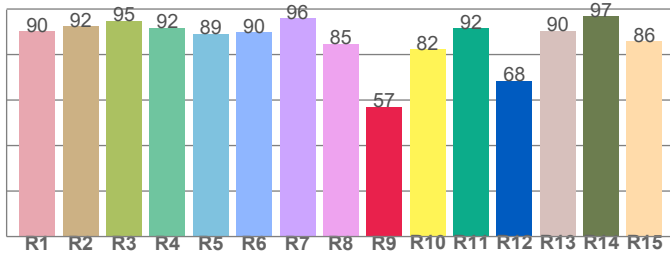
### CIE 1931



### CIE 1931 – zoomed on Planckian locus



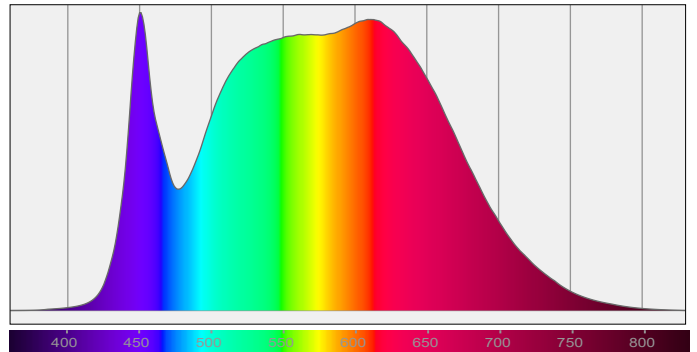
### Color Rendering Index per reference color (CIE 1995)



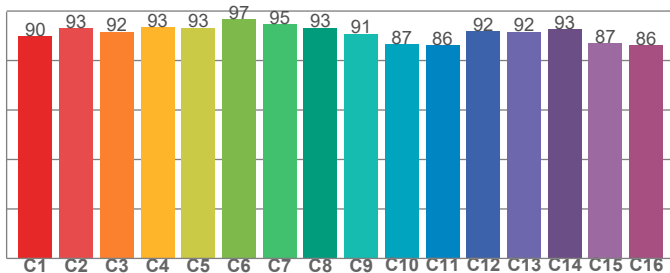
CRI R values, only R1-R8 are used to calculate final CRI value

R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
90,2	92,4	94,8	91,8	89,1	89,8	95,9	84,7	57,1	82,3	91,5	68,4	90,5	96,9	85,9

### Spectral power distribution (SPD) / W/nm – 0-100%



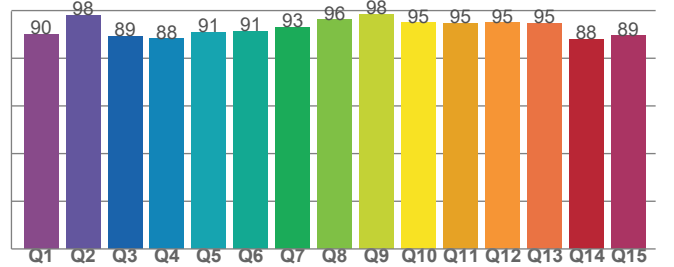
### TM30-18 R<sub>f</sub>-values per hue bin



TM30 C values, 16 binned values out of total of 99 C values

C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16
89,9	93,2	91,6	93,5	93,2	96,6	94,7	93,2	90,8	86,6	86,1	91,8	91,6	92,7	86,9	86,2

### Color Quality Scale by reference color



CQS Q values

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
90,0	98,1	89,4	88,2	90,8	91,3	93,1	96,2	98,4	94,9	94,7	94,9	94,8	88,1	89,4

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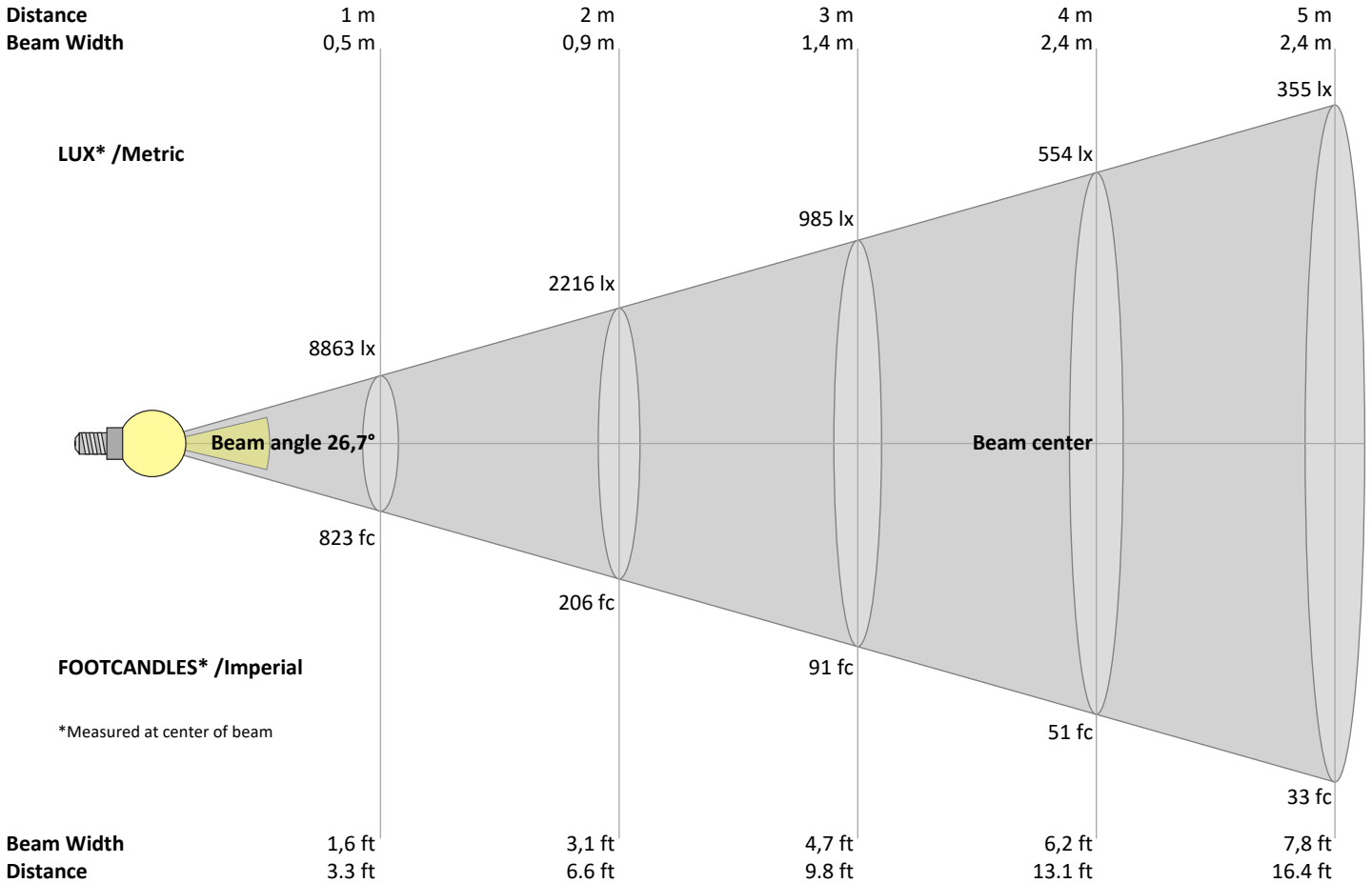
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## Beam Details



### Beam intensities from 1 – 20 m

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	m
3,3	6,6	9,8	13,1	16,4	19,7	23	26,2	29,5	32,8	36,1	39,4	42,7	45,9	49,2	52,5	55,8	59,1	62,3	65,6	ft
8863	2216	985	554	355	246	181	138	109	89	73	62	52	45	39	35	31	27	25	22	lux
823,4	205,8	91,5	51,5	32,9	22,9	16,8	12,9	10,2	8,2	6,8	5,7	4,9	4,2	3,7	3,2	2,8	2,5	2,3	2,1	fc

### Intensities in 0° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
8863	8863	8427	7780	7072	6076	5080	4135	3214	2356	1787	1219	873	633	420	331	243	190	154	122	cd
100%	100%	95%	88%	80%	69%	57%	47%	36%	27%	20%	14%	10%	7%	5%	4%	3%	2%	2%	1%	of 0°val

### Intensities in 90° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
8863	8863	8427	7780	7072	6076	5080	4135	3214	2356	1787	1219	873	633	420	331	243	190	154	122	cd
100%	100%	95%	88%	80%	69%	57%	47%	36%	27%	20%	14%	10%	7%	5%	4%	3%	2%	2%	1%	of 0°val

### Intensities in 180° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
8863	8863	8427	7780	7072	6076	5080	4135	3214	2356	1787	1219	873	633	420	331	243	190	154	122	cd
100%	100%	95%	88%	80%	69%	57%	47%	36%	27%	20%	14%	10%	7%	5%	4%	3%	2%	2%	1%	of 0°val

### Intensities in 270° c-plane

0°	2°	4°	6°	8°	10°	12°	14°	16°	18°	20°	22°	24°	26°	28°	30°	32°	34°	36°	38°	γ
8863	8863	8427	7780	7072	6076	5080	4135	3214	2356	1787	1219	873	633	420	331	243	190	154	122	cd
100%	100%	95%	88%	80%	69%	57%	47%	36%	27%	20%	14%	10%	7%	5%	4%	3%	2%	2%	1%	of 0°val

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## Light Planning – UGR table

Uncorrected, comprehensive UGR table according to 117-1995

Reflectances		70	70	50	50	30	70	70	50	50	30
	ρ Ceiling	70	70	50	50	30	70	70	50	50	30
	ρ Walls	50	30	50	30	30	50	30	50	30	30
	ρ Floor	20	20	20	20	20	20	20	20	20	20
Room size		Viewed Crosswise					Viewed Endwise				
H = mounting height above eye level		(Viewing direction orthogonal to lamp length axis)					(Viewing direction parallel to lamp length axis)				
X	Y										
2H	2H	16,5	16,9	16,5	17,1	17,3	16,5	16,9	16,5	17,1	17,3
	3H	16,6	17,2	17,0	17,4	17,6	16,6	17,2	17,0	17,4	17,6
	4H	16,7	17,3	17,1	17,6	17,8	16,7	17,3	17,1	17,6	17,8
	6H	16,9	17,4	17,2	17,7	18,0	16,9	17,4	17,2	17,7	18,0
	8H	16,9	17,3	17,2	17,7	18,0	16,9	17,3	17,2	17,7	18,0
	12H	16,8	17,3	17,2	17,7	18,1	16,8	17,3	17,2	17,7	18,1
4H	2H	16,4	17,0	16,8	17,2	17,4	16,4	17,0	16,8	17,2	17,4
	3H	16,9	17,3	17,2	17,7	18,1	16,9	17,3	17,2	17,7	18,1
	4H	17,0	17,4	17,4	17,9	18,4	17,0	17,4	17,4	17,9	18,4
	6H	17,1	17,6	17,6	17,9	18,3	17,1	17,6	17,6	17,9	18,3
	8H	17,1	17,6	17,7	17,9	18,3	17,1	17,6	17,7	17,9	18,3
	12H	17,1	17,5	17,6	17,9	18,3	17,1	17,5	17,6	17,9	18,3
8H	4H	17,0	17,5	17,5	17,8	18,2	17,0	17,5	17,5	17,8	18,2
	6H	17,2	17,5	17,7	18,0	18,5	17,2	17,5	17,7	18,0	18,5
	8H	17,3	17,5	17,8	18,1	18,7	17,3	17,5	17,8	18,1	18,7
	12H	17,3	17,5	17,9	18,0	18,6	17,3	17,5	17,9	18,0	18,6
12H	4H	17,0	17,3	17,5	17,7	18,2	17,0	17,3	17,5	17,7	18,2
	6H	17,3	17,5	17,8	18,0	18,6	17,3	17,5	17,8	18,0	18,6
	8H	17,3	17,5	17,9	18,0	18,6	17,3	17,5	17,9	18,0	18,6

### Variations with the observer position for the luminaire spacings, S:

S = 1.0H	2,1 / -1,4	2,1 / -1,4
S = 1.5H	4,0 / -2,1	4,0 / -2,1
S = 2.0H	5,6 / -2,9	5,6 / -2,9

## Coefficients of Utilization

Ceiling reflectance	80			70			50			30			10			0		
Wall reflectance	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
Floor reflectance	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20	0
RCR	(RCR: Room Cavity Ratio)																	
	Room Values are expressed as percentage of Lumen delivered to the task surface																	
0	119	119	119	119	116	116	116	116	111	111	111	106	106	106	102	102	102	100
1	115	112	110	108	112	110	108	107	106	105	103	103	101	100	99	98	97	96
2	110	107	103	101	108	105	102	99	102	99	97	99	97	95	96	95	93	92
3	107	101	98	94	105	100	97	94	98	95	92	95	93	91	93	91	89	88
4	103	97	93	90	101	96	92	89	94	91	88	92	89	87	90	88	86	85
5	100	93	89	85	98	92	88	85	91	87	84	89	86	84	88	85	83	82
6	96	90	85	82	95	89	85	82	88	84	81	86	83	81	85	82	80	79
7	93	86	82	79	92	86	82	79	85	81	78	84	80	78	83	80	78	76
8	91	84	79	76	90	83	79	76	82	78	76	81	78	75	80	77	75	74
9	88	81	77	74	87	81	76	74	80	76	73	79	76	73	78	75	73	72
10	86	78	74	71	85	78	74	71	77	74	71	77	73	71	76	73	71	70

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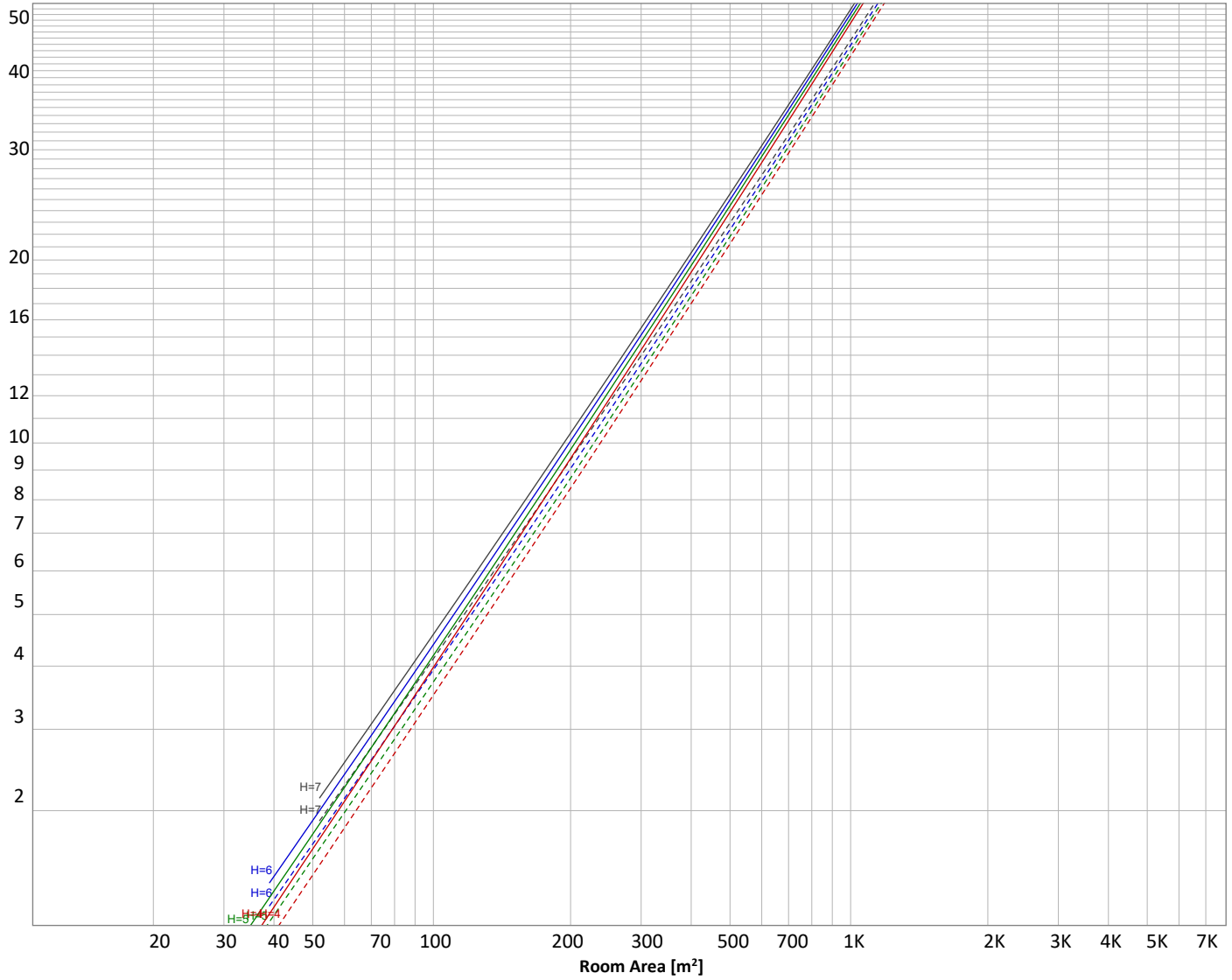
Operator:



## Luminaire budgetary diagram

Uncorrected, comprehensive UGR table according to 117-1995

LAMPS (number of lamps)



### Conditions

H = Room height	Flux = 2279 lm				
H <sub>down</sub> = Lamp distance from ceiling =	0.00 m	Line type	Ceiling reflectance	ρ(%) Wall reflectance	Floor reflectance
H <sub>work</sub> = Work area height from floor =	0.00 m	-----	70	50	30
E <sub>work</sub> = Average lux on work area =	100 lx	_____	50	30	20

### Zonal Lumen Summary

0°-10°	10°-20°	20°-30°	30°-40°	40°-50°	50°-60°	60°-70°	70°-80°	80°-90°
733 lm	986 lm	339 lm	107 lm	55,2 lm	31,1 lm	16,5 lm	8,23 lm	1,94 lm
90°-100°	100°-110°	110°-120°	120°-130°	130°-140°	140°-150°	150°-160°	160°-170°	170°-180°
0,011 lm	0,001 lm	0,037 lm	0,002 lm	0,040 lm	0,208 lm	0,389 lm	0,284 lm	0,060 lm

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## Outdoor Light Planning

### Lumen per Zone

Zone (γ)	Lumen	% Total
0-10°	733 lm	32,1%
10-20°	986 lm	43,3%
20-30°	339 lm	14,9%
30-40°	107 lm	4,7%
40-50°	55 lm	2,4%
50-60°	31 lm	1,4%
60-70°	17 lm	0,7%
70-80°	8 lm	0,4%
80-90°	2 lm	0,1%
90-100°	0 lm	0,0%
100-110°	0 lm	0,0%
110-120°	0 lm	0,0%
120-130°	0 lm	0,0%
130-140°	0 lm	0,0%
140-150°	0 lm	0,0%
150-160°	0 lm	0,0%
160-170°	0 lm	0,0%
170-180°	0 lm	0,0%
<b>Total</b>	<b>2279 lm</b>	<b>100,0%</b>

### Intensity peaks

Max intensity	8863 cd
Intensity, 90°	0 cd
Intensity, 0°	8863 cd

### Zonal Lumen summary

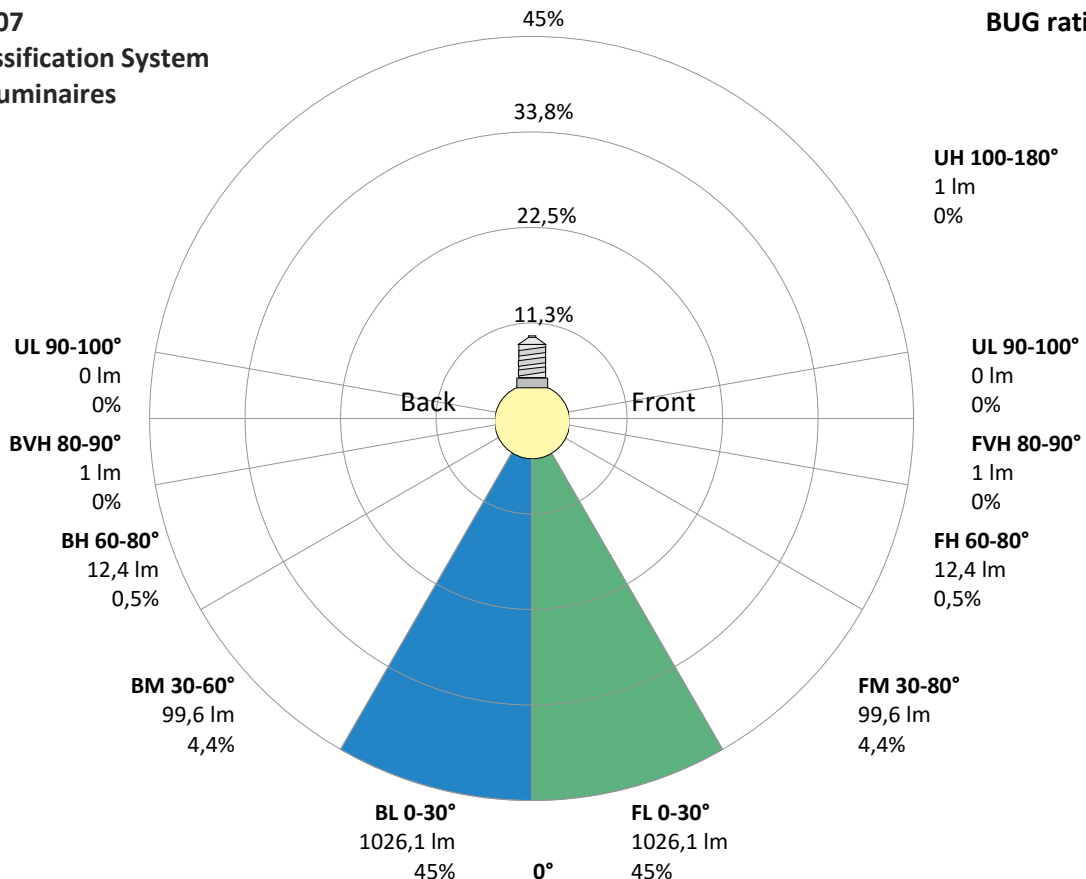
Zone (γ)	Lumen	% Total
0-30°	2058 lm	90,3%
0-40°	2165 lm	95,0%
0-60°	2252 lm	98,8%
60-90°	27 lm	1,2%
70-100°	10 lm	0,4%
90-120°	0 lm	0,0%
0-90°	2278 lm	100,0%
90-180°	1 lm	0,0%
0-180°	2279 lm	100,0%

### BUG rating

	Lumen	% Total
<b>Forward light</b>		
Low(0-30°)	1026 lm	45,0%
Medium(30-60°)	100 lm	4,4%
High(60-80°)	12 lm	0,5%
Very high(80-90°)	1 lm	0,0%
<b>Back light</b>		
Low(0-30°)	1026 lm	45,0%
Medium(30-60°)	100 lm	4,4%
High(60-80°)	12 lm	0,5%
Very high(80-90°)	1 lm	0,0%
<b>Uplight</b>		
Low(90-100°)	0 lm	0,0%
High(100-180°)	1 lm	0,0%

## IESNA TM-15-07 Luminaire Classification System For Outdoor Luminaires

**BUG rating B3 U1 G0**



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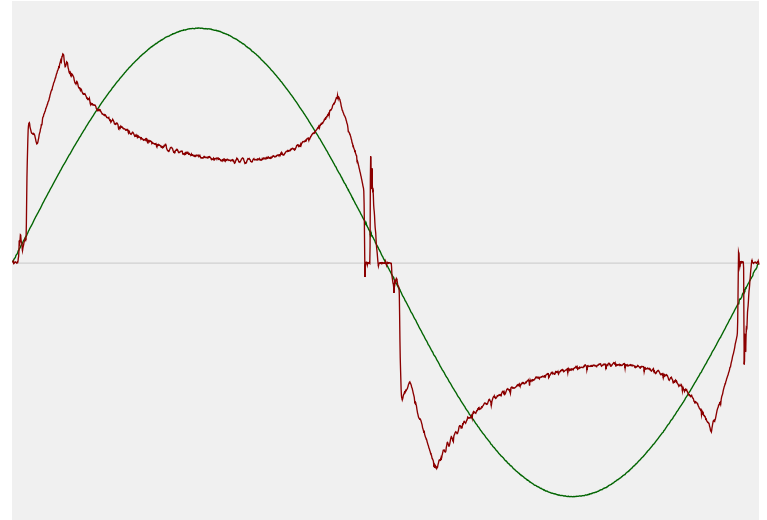


## Power Details

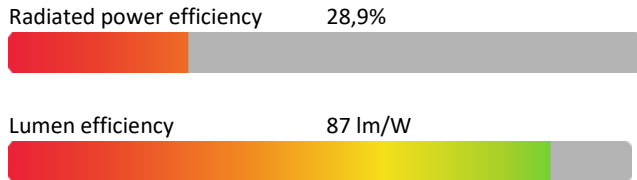
### Input Power

Power feed to light source	26,2 W
Frequency of input power	50 Hz
RMS Input voltage feed, $V_{RMS}$	230 V
RMS Input current feed, $I_{RMS}$	0,130 A
Volt-Ampere or apparent power = $V_{RMS} * I_{RMS}$	29,95 VA
Displacement factor of AC power feed	0,99
Power factor of AC current feed	0,87
Total harmonic distortion of the current	52,54%
Total harmonic distortion of the voltage	0,09%

### Input Power Curve



### Efficiency



## Stabilization Details

### Warmup Conditions

Stable period	15 min
Stable change max	2,0%
Minimum time	15 min

### Color Temperature Change

CCT start	3999 K
CCT shift	+1 K
CCT end	4000 K

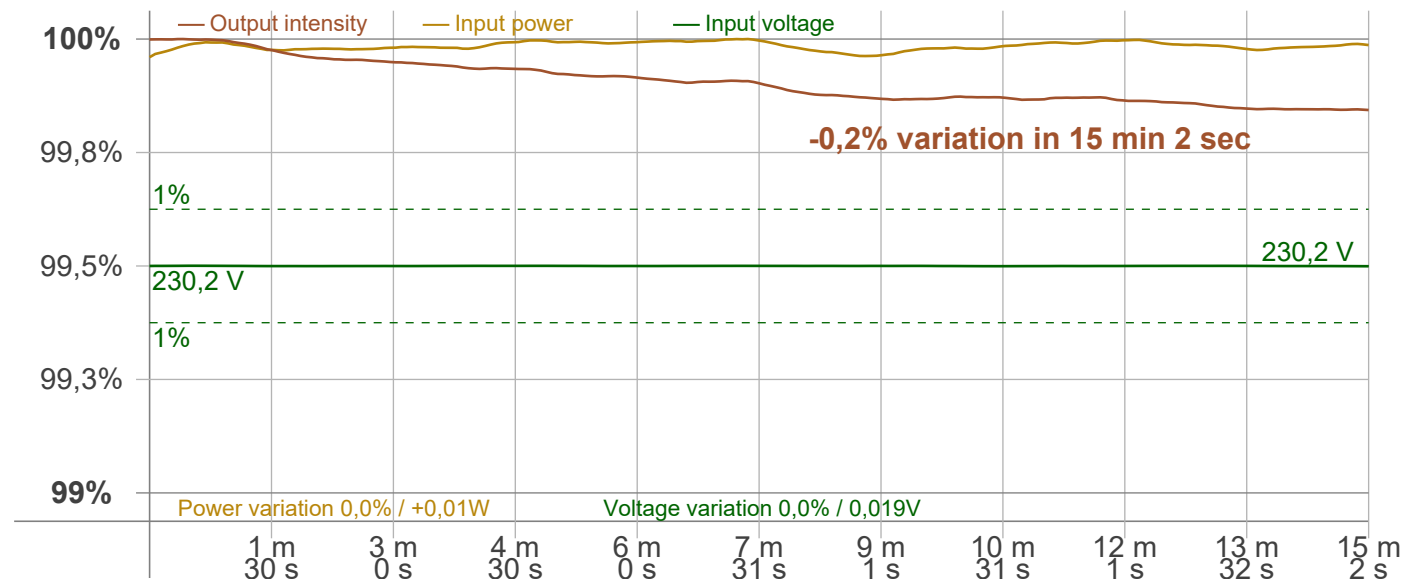
### Warmup Result

Total warmup time	Lamp stabilized in 15 min 2 sec
Warmup variation	-0,2%

### Output Change

Output start	2283 lm
Output change	-3 lm
Output end	2279 lm

### Stabilization Curve



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## Flicker /TLA details

Flicker Meter Type Viso Systems LabFlicker  
 Frequency of input power 50 Hz  
 Flicker/TLA sample rate 20000 samples/s

**Measurement time**  
 PstLM 180 sec  
 All other indices 1,2 sec

### Flicker indices according to Illuminating Engineering Society (IES)

Flicker frequency 100 Hz  
 Percent Flicker 1,07 %  
 Flicker index 0

### Flicker indices according to California Energy Commission (CEC) 2016b

JA8/10 40 Hz 0,09 %  
 JA8/10 90 Hz 0,09 %  
 JA8/10 200 Hz 0,92 %  
 JA8/10 400 Hz 1,01 %  
 JA8/10 1000 Hz 1,05 %

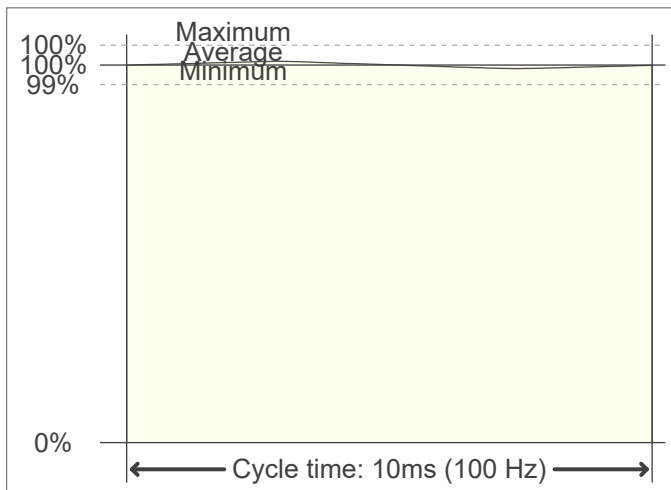
### TLA indices (re IEC TR 61547-1, IEC 61000-3-3 and IEC 61000-4-15)

PstLM value (F < 80 Hz) 0,12  
 SVM value (80 < F < 2000 Hz) 0,03

### Flicker indices according to Lighting Research Center (2015)

Perception metric, Assist Mp 0,06

### Flicker frame (frame of one flicker period in time domain)



### Flicker FFT (flicker curve in frequency domain)



### IEEE 1789 Frequency/modulation plot

